Electrical Networks Analysis & synth. INST

sem-III / 09-06-14

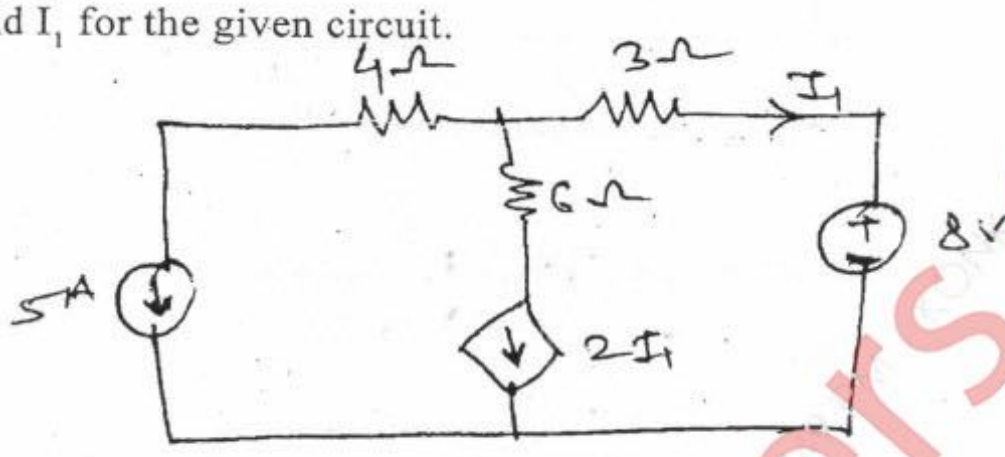
QP Code : **NP-18758**

(3 Hours) **[Total Marks : 80**

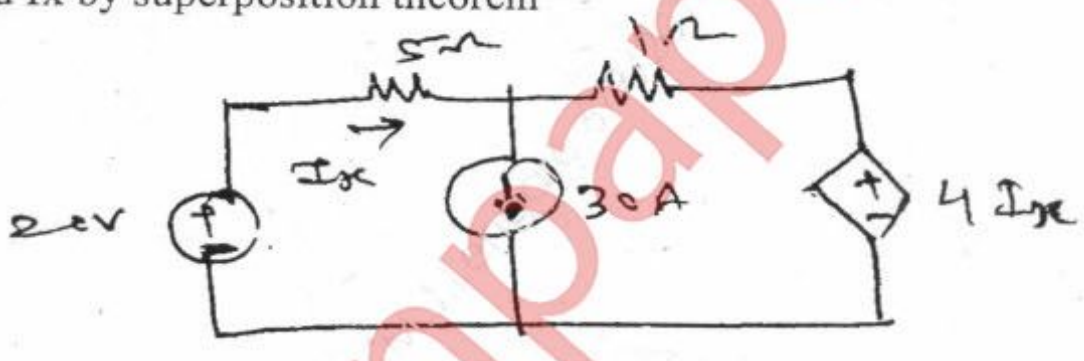
N.B. : (1) Question No. **1** is compulsory.
(2) Solve any three questions from the remaining questions.
(3) Assume & mention suitable data, if required.
(4) Figures to the right indicate full marks.

1. Solve any **four** : **20**

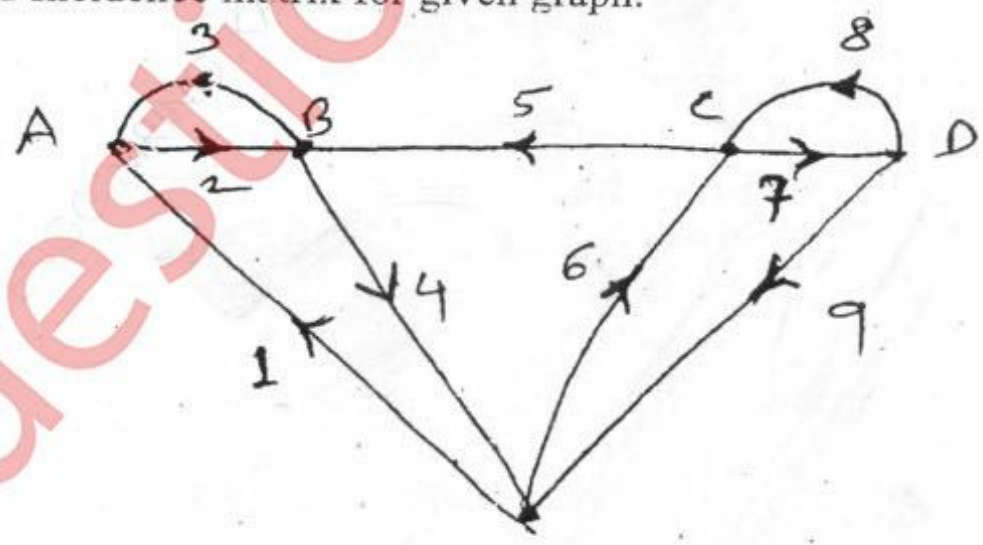
(a) Find I_1 for the given circuit.



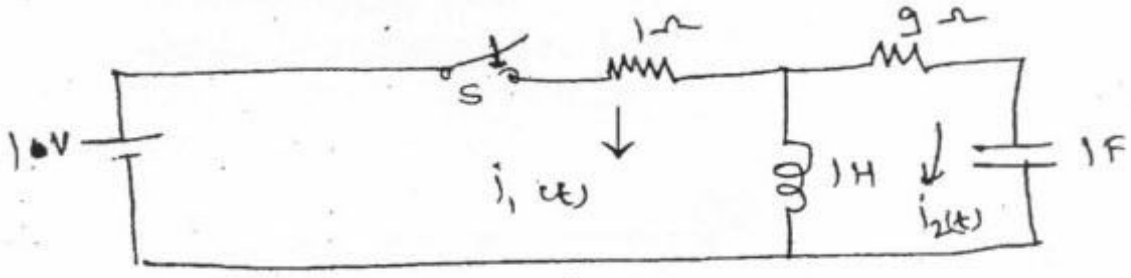
(b) Find Ix by superposition theorem



(c) Find Incidence matrix for given graph.

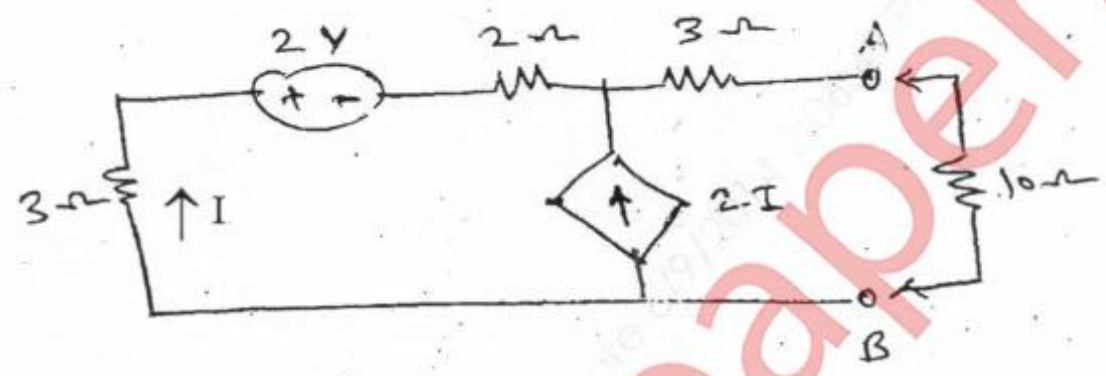


(d) Find $i_1(0^+)$ & $i_2(0^+)$ for given circuit. Switch is closed at t = 0

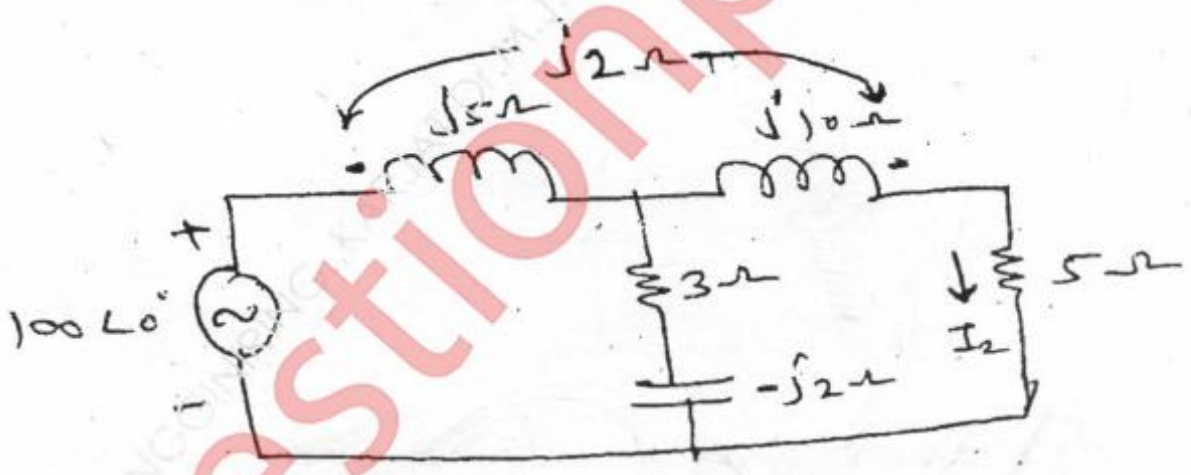


(e) What are the properties of a positive real function?

2. (a) Find the Nortons equivalent circuit across terminals A-B. for the given circuit. Also find current through 10 Ω resistor. **10**



(b) Find I_2 by mesh analysis **10**



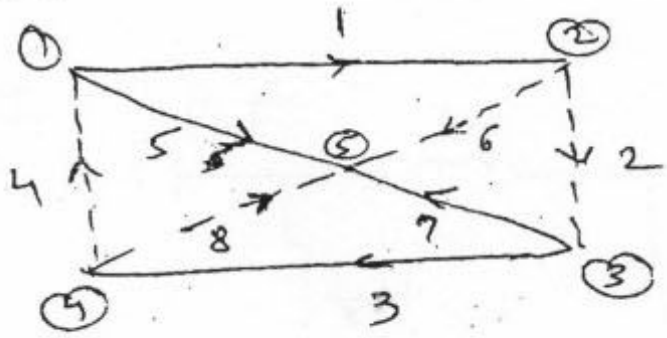
3. (a) Write **10**

(i) Incidence matrix [Aa]

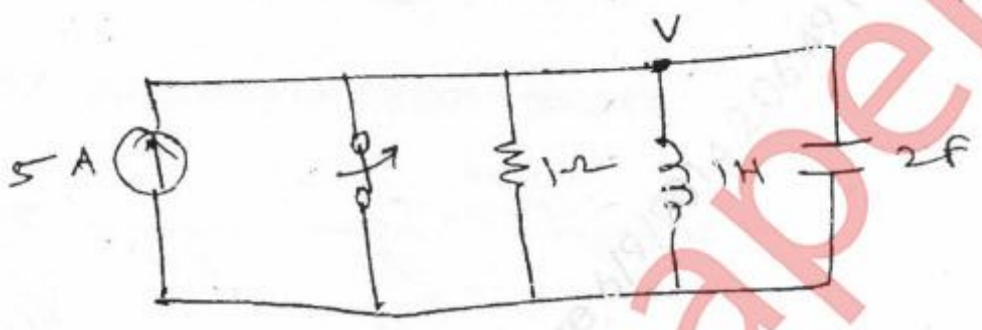
(ii) Reduced Incidence matrix [A]

(iii) Tieset matrix

for the graph shown below

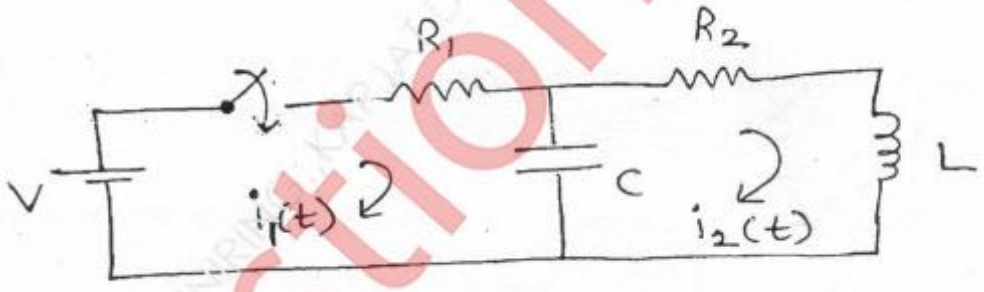


(b) find V, $\frac{dV}{dt}$, $\frac{d^2V}{dt^2}$ for given circuit. if switch is opened at t = 0. **10**

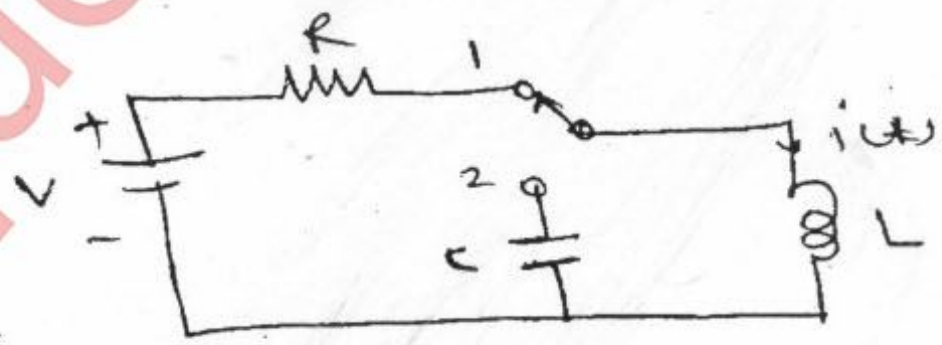


4. (a) For the network shown below assume all the initial conditions to be zero. **10**

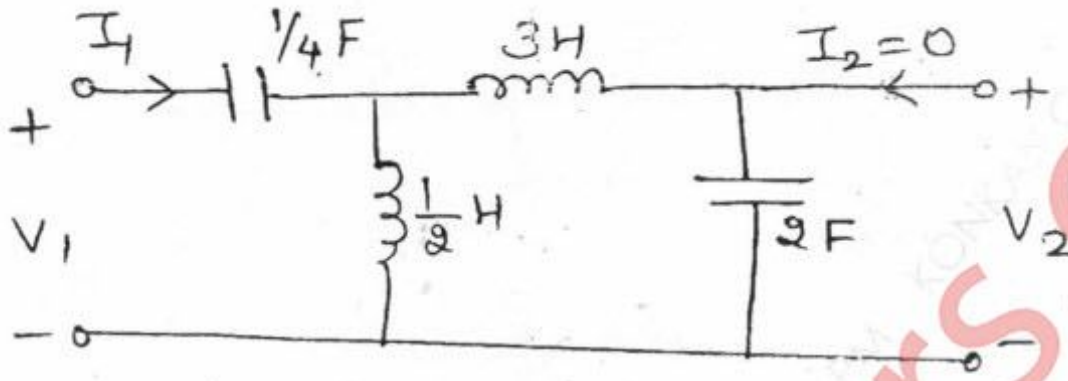
Find $i_1(0^+)$, $i_2(0^+)$, $\frac{di_1}{dt}(0^+)$, $\frac{di_2}{dt}(0^+)$ and $\frac{d^2i_1}{dt^2}(0^+)$.



(b) The given network has reached steady state when switch is in position 1. **10**
At time t=0 switch is moved from position 1 to position 2. Determine i(t)



5. (a) Find the network functions $\frac{V_2}{V_1}$, $\frac{V_1}{I_1}$ and $\frac{V_2}{I_1}$ for the network shown below :– **10**



(b) Find Z - parameters for the given network. **10**

6. (a) Test whether the following polynomial is Hurwitz or not **10**
$s^7 + 3s^6 + 8s^5 + 15s^4 + 17s^3 + 12s^2 + 4s$

(b) Synthesize in foster II form **10**

$$Z(s) = \frac{6s^4 + 42s^2 + 48}{s^5 + 18s^3 + 48s}$$
